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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,809	09/16/2003	Seiji Nagai	T36-159069M/KOH	1114

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MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC  
8321 OLD COURTHOUSE ROAD  
SUITE 200  
VIENNA, VA 22182-3817

EXAMINER
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RAO, G NAGESH

ART UNIT	PAPER NUMBER
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1722

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/662,809

Applicant(s)

NAGAI ET AL.

Examiner

G. Nagesh Rao

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

*Allowable Subject Matter*

1) The indicated allowability of claim 4 is withdrawn in view of the newly discovered reference(s) to Tischler (US PG Pub 2002/0028314). Rejections based on the newly cited reference(s) follow.

*Claim Rejections - 35 USC § 112*

2) Claims 1-2 and 8-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant claims the a method utilizing halide vapor phase epitaxy deposition, however upon review of the specification, the HVPE process utilizes HCl gas etchant in carrying out the claimed "halide" process. The HCl is not a halide but a hydride agent, and further proof is substantiated in the art rejection below utilizing the Tischler (PG Pub 2002/0028314) reference as evidence that HCl when used encompasses a hydride vapor phase epitaxy method.

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3) Claims 1-18 are rejected under 35 U.S.C. 102(e) as anticipated by Tischler (US Pg Pub 2002/0028314).

Examiner has reviewed applicant's arguments and after consideration is withdrawing the initial rejection over the prior art of Shibata 610. However examiner is putting forth Tischler 314 since it appears to read on applicant's teachings. Examiner is also withdrawing the allowability of claim 4 based on discovery of the Tischler 314 reference.

Tischler 314 pertains to a process for producing Gallium-Nitride (GaN) semiconductor substrates via a variety of various methods in examples disclosed in the specification furthermore note that Tischler 314 refers to the GaN layer as a metal nitride (M\*N) however that is understood by the examiner to be a synonym for a Group III-V nitride material (See Sections 0002-0013). Tischler 314 teaches a

sacrificial silicon substrate having been etched away via HCl while the substrate/M\*N structure is preferably maintained (See Sections 0014-0019).

The M\*N layer for example GaN may be deposited directly on the surface of the crystalline or non-crystalline substrate, or alternatively it may be deposited on an upper most surface of one or more intermediate layers which in turn are deposited on the crystalline substrate. The one or more intermediate layers may serve as a buffer layer to enhance the crystallinity of the M\*N layer, as a template for the subsequent M\*N growth thereon, or the intermediate layer(s) may serve as protective layer(s) or as an etch stop to prevent the etchant for the sacrificial substrate from etching into the M\*N material (See Section 0020-0021) but thereby denoting that the etch could occur from the rear portion of the sacrificial substrate since the intermediate buffer layers are followed by the substrate before the top layer of M\*N is completely processed. As well the M\*N layer could contain more aluminum in the Group III nitride compound in the event the layer is decidedly an AlN layer or a AlGa<sub>N</sub> or AlGaInN layer (See Sections 0092-0093).

The growth of the M\*N layer material may be carried out in a HVPE reactor whereby although denoted as a hydride vapor phase epitaxy reactor, examiner qualifies this as an equivalent and capable of handling applicant's claim of a halide vapor phase epitaxy. Upon reviewing applicant's specification, examiner noted the

reference of HVPE as being a halide based reactor due to the use of HCl (applicant's specification) as a gaseous etchant with respect to the specification language on page 10 Lines 9-20. Although Tischler 314 denotes HVPE differently, it does disclose the use of HCl as the gaseous etchant for creating the free standing M\*N semiconductor substrate.

Furthermore Tischler 314 teaches processing parameters for the HVPE method have temperatures growth for a GaN layer be between 1000-1200<sup>0</sup>C and the desired thickness range be between 1-1000 microns but preferably at 100-300 microns thus reading on claimed thickness and temperature variations as claimed by applicant (See Section 0050 and 0025) as well the ability to grow more than one layer of M\*N materials as suggested by the language of section 0051.

Finally Tischler 314 teaches an ability to prevent lattice mismatch dislocation in particular preventing dislocations i.e. warping of the M\*N substrate material which is in turn a form of a Group III nitride compound (See Section 0040). This and the fact that the methodology of creating said substrate will have the rear surface of said silicon substrate opposing the surface on which said group III nitride compound semiconductor layer is formed.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to G. Nagesh Rao whose telephone number is (571) 272-2946. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GNR

DUANE SMITH  
PRIMARY EXAMINER

  
3-20-06